

6.4 and 6.5: Intro to a Sampling Distribution – What exactly is that?

First, let's remember our statistical relationships and notation:

Population

Sample

A discussion on Paper:

So far, we have always been given the parameters (mean, standard deviation, and proportions) for any population that we work with.

Great. But, in the real world, is that always possible? _____ Why?

So how do we find out information about a population that we are interested in?

Consider our population for today as an example. If I consider the population of all of the pennies in the United States, is it possible to find the average date of the pennies that are in circulation?

Because it is not possible we take a sample to help us determine what the average date may be. Will the average date of our individual sample match the true average date of the population?

Will the average date of my sample of pennies be the same as Nick's mean of the sample of pennies that he has?

If my sample of penny dates has a different mean than Nick's sample and other sample means, then how can we use our sample data to estimate the true mean of the population of pennies?

What is a Sampling Distribution?

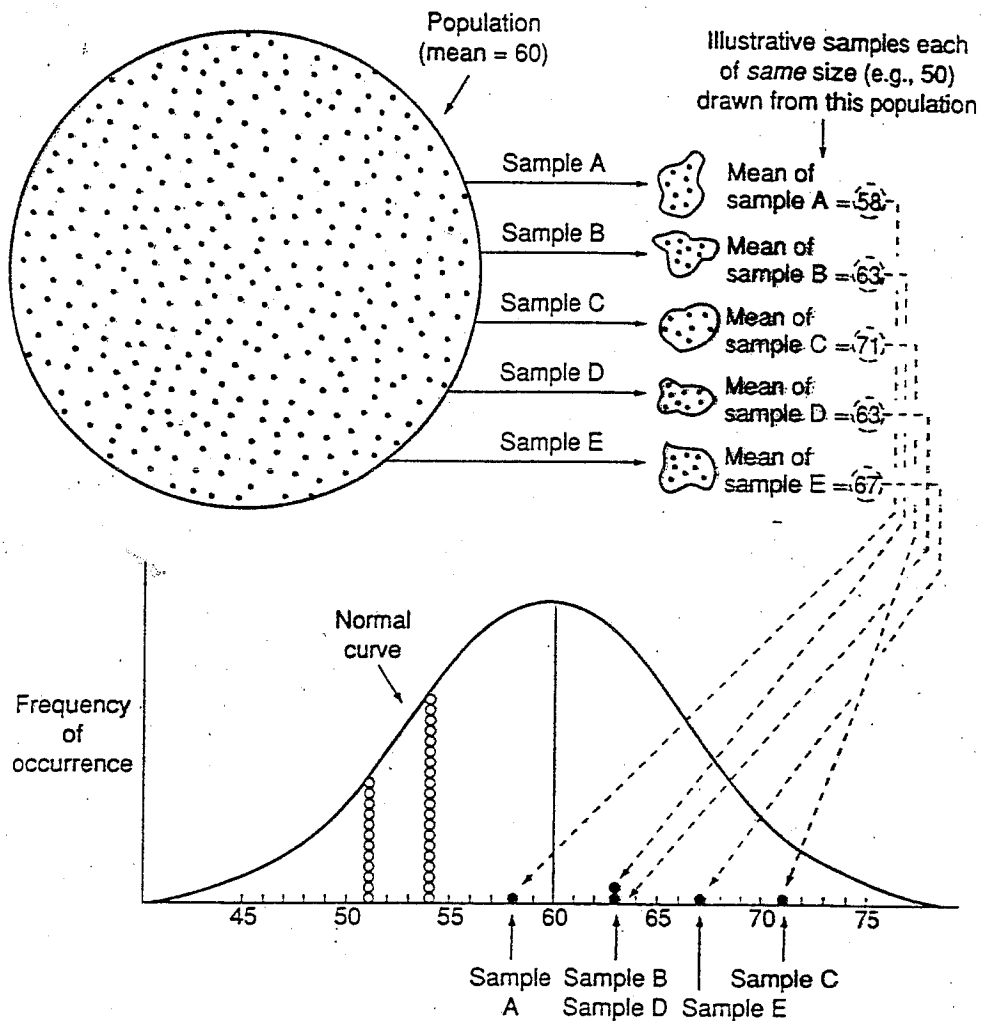
The Goal: _____

Sampling Distributions are _____. In reality we cannot find all possible samples from a population. (If we could, then we would actually know the population parameters and there is no point to learning about sampling distributions.) Think about our pennies. Is it possible for us to find all possible samples of pennies in the U.S.? **Absolutely not.**

So why can we use our knowledge of sampling distributions, if it is impossible for us to create the whole distribution?

1.)

2.)



In this illustration, five samples have been selected, and the mean of each sample has been calculated. This procedure is (in theory) continued until an infinite number of samples is selected and their means calculated. The five means for samples A–E are shown. Each possible mean value would have a frequency (e.g., as shown for the values of 51 and 54). When all the means are plotted, the resulting smoothed frequency polygon will have the shape of a normal curve. This is known as the sampling distribution of the mean.

FIGURE 1.21 A SAMPLING DISTRIBUTION (OF MEANS)

Source: *Visual Statistics* by Fraenkel, Sawin, & Wallen (1999)